IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

<u>REDACTED PUBLIC VERSION</u>

TELCORDIA TECHNOLOGIES, INC.,

Plaintiff/Counterclaim Defendant,

v.

LUCENT TECHNOLOGIES, INC.,

Defendant/Counterclaim Plaintiff.

Civil Action No. 04-875-GMS

TELCORDIA TECHNOLOGIES, INC.,

Plaintiff/Counterclaim Defendant,

v.

CISCO SYSTEMS, INC.,

Defendant/Counterclaim Plaintiff.

Civil Action No. 04-876-GMS

APPENDIX C IN SUPPORT OF
TELCORDIA'S ANSWERING BRIEF IN PARTIAL OPPOSITION TO
DEFENDANTS' MOTION FOR SUMMARY JUDGMENT OF
<u>NON-INFRINGEMENT OF U.S. PATENT NO. 4,893,306</u>

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Dated: October 25, 2006

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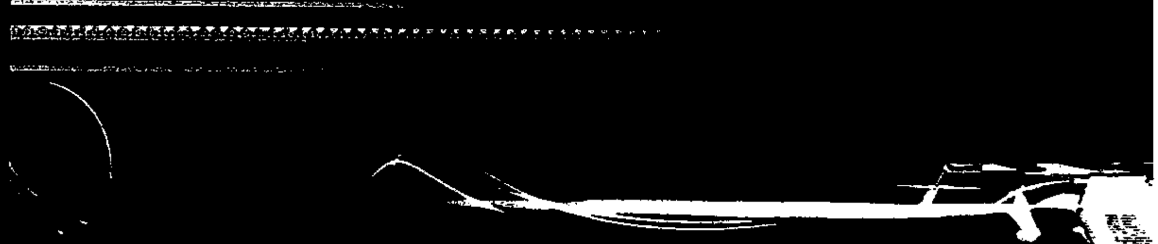

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Fourth Edition

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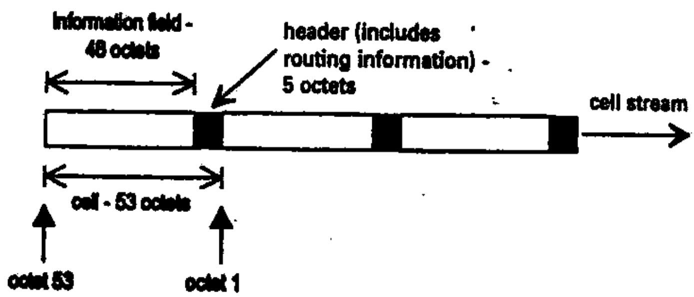


Figure 16.4. An ATM cell stream illustrating the basic makeup of a cell.

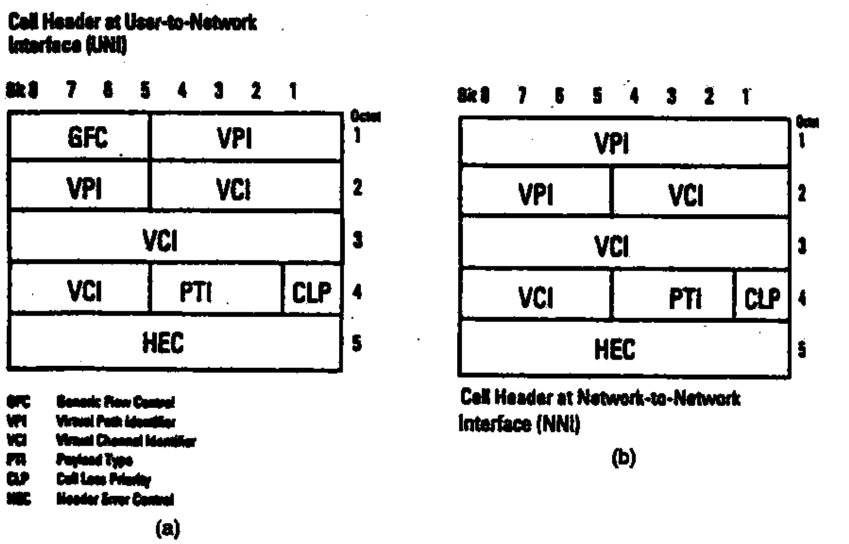


Figure 16.5. Basic ATM header structures. (a) UNI cell header structure; (b) NNI header structure.

cell stream delineating the 5-octet header and 48-octet information field of each cell. Figure 16.5 shows the detailed structure of the cell headers at the user–network interface (UNI) (Figure 16.5a) and at the network–node interface (NNI)* (Figure 16.5b).

We digress a moment to discuss why a 53-octet cell was standardized. The cell header contains only 5 octets. It was shortened as much as possible containing the minimum address and control functions for a working system. It is also non-revenue-bearing overhead. It is the information field that contains the revenue-bearing payload. For efficiency, we'd like the payload to be as long as possible. Yet the ATM designer team was driven to shorten the payload as much as possible.

* NNI is variously called network–node interface or network–network interface. It is the interface between two network nodes or switches.

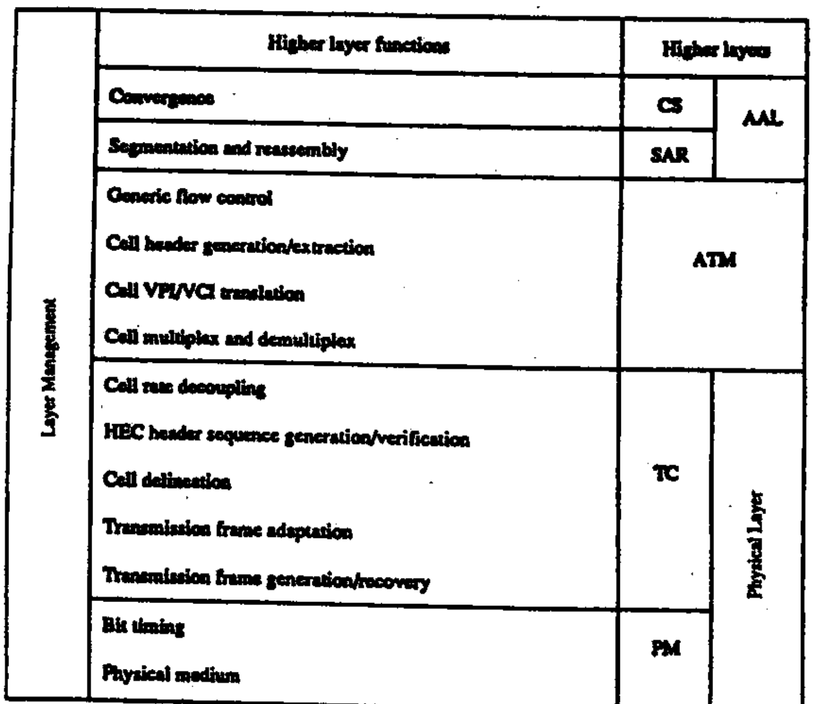
6 ATM LAYERING AND B-ISDN

The B-ISDN reference model is given in Figure 16.3, and its several planes are described. This section provides brief descriptions of the ATM layers and sublayers.

6.1 Functions of Individual ATM/B-ISDN Layers

Figure 16.11 illustrates B-ISDN/ATM layering and sublayering of the protocol reference model. It identifies the functions of the physical layer, the ATM layer and the AAL, and related sublayers.

6.1.1 Physical Layer. The physical layer consists of two sublayers. The physical medium (PM) sublayer includes only physical medium-dependent functions. The transmission convergence (TC) sublayer performs all functions required to transform a flow of cells into a flow of data units (i.e., bits) which can be transmitted and received over a physical medium. The service data unit (SDU) crossing the boundary between the ATM layer and the physical layer is a flow



CS Convergence sublayer
PM Physical medium
SAR Segmentation and reassembly sublayer
TC Transmission convergence

Figure 16.11. B-ISDN/ATM functional layering.

of valid cells. The ATM layer is unique (meaning independent of the underlying physical layer). The data flow inserted in the transmission system payload is physical medium-independent and self-supported. The physical layer merges the ATM cell flow with the appropriate information for cell delineation, according to the cell delineation mechanism described above and carries the operations and maintenance (OAM) information relating to this cell flow.

The physical medium sublayer provides bit transmission capability including bit transfer and bit alignment as well as line coding and electrical-optical transformation. Of course, the principal function is the generation and reception of waveforms suitable for the medium, the insertion and extraction of bit timing information, and line coding where required. The primitives identified at the border between the PM and TC sublayers are a continuous flow of logical bits or symbols with this associated timing information.

TRANSMISSION CONVERGENCE SUBLAYER FUNCTIONS. Among the important functions of this sublayer is the generation and recovery of transmission frame. Another function is transmission frame adaptation which includes the actions necessary to structure the cell flow according to the payload structure of the transmission frame (transmit direction) and to extract this cell flow out of the transmission frame (receive direction). The transmission frame may be a cell equivalent (i.e., no external envelope is added to the cell flow), an SDH/SONET envelope, an E1/T1 envelope, and so on. In the transmit direction, the HEC sequence is calculated and inserted in the header. In the receive direction, we include cell header verification. Here cell headers are checked for errors and, if possible, header errors are corrected. Cells are discarded where it is determined that headers are errored and are not correctable.

Another transmission convergence function is cell rate decoupling. This involves the insertion and removal of idle cells in order to adapt the rate of valid ATM cells to the payload capacity of the transmission system. In other words, cells must be generated to exactly fill the payload of SDH/SONET, as an example, whether the cells are idle or busy.

Section 12 of this chapter gives several examples of transporting cells using the convergence sublayer.

6.1.2 The ATM Layer. Table 16.4 shows the ATM layer functions supported at the UNI (U-plane). The ATM layer is completely independent of the physical medium. One important function of this layer is *encapsulation*. This includes cell header generation and extraction. In the transmit direction, the cell header generation function receives a cell information field from a higher layer and generates an appropriate ATM cell header except for the header error control (HEC) sequence. This function can also include the translation from a service access point (SAP) identifier to a VP (virtual path) and VC (virtual circuit) identifier.

In the receive direction, the cell header extraction function removes the ATM cell header and passes the cell information field to a higher layer. As in the transmit direction, this function can also include a translation of a VP and VC identifier into an SAP identifier.

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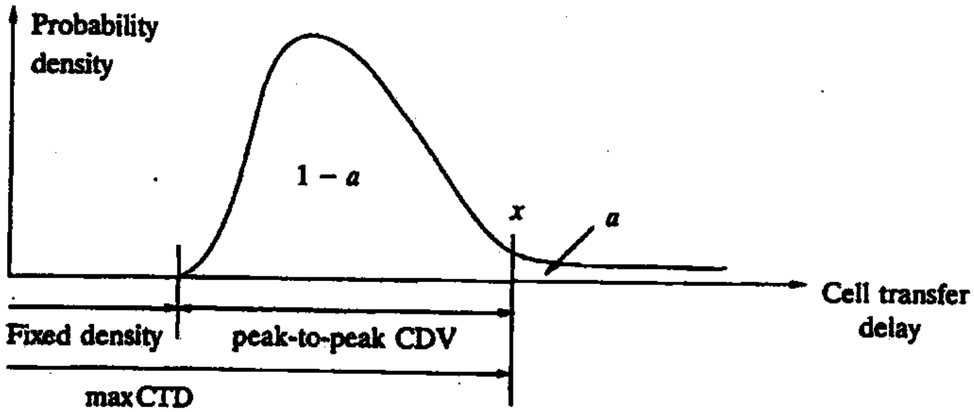

Fig. 1.8 Distribution of cell transfer delay.

priority, and CLP = 1 for low priority), which is initially set by the user and can be changed by a BSS within the connection's path.

Figure 1.8 shows a typical distribution of the cell transfer delay through a switch node. The fixed delay is attributed to the delay of table lookup and other cell header processing, such as header error control (HEC) byte examination and generation. For QoS classes 1, 3, and 4, the probability of cell transfer delay (CTD) greater than 150 μs is guaranteed to be less than $1 - 0.99$, that is, Prob[CTD > 150 μs] < 1 − 99%. For this requirement, $a = 1\%$ and $x = 150$ μs in Figure 1.8. The probability of CDV greater than 250 μs is required to be less than 10^{-10} for QoS class 1, that is, Prob[CDV > 250 μs] < 10^{-10}.

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Exhibit 4.11

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